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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/756,971	01/09/2001	Salman Akram	MI22-1572	7766
21567	7590	08/03/2004	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			ZARNEKE, DAVID A	
			ART UNIT	PAPER NUMBER
			2827	

DATE MAILED: 08/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/756,971

Applicant(s)

AKRAM, SALMAN

Examiner

David A. Zameke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-49, 51, 52 and 55-79 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 45-49, 51, 52, 55, 56 and 58-79 is/are allowed.
- 6) ☒ Claim(s) 42-44 and 57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 7/13/04.
- 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 6/7/04 with respect to claims 42 and 57 have been fully considered but they are not persuasive.

Regarding claim 42, applicant argues that silver is not an art-recognized equivalent to copper because silver is cost prohibitive.

The examiner asserts that cost does not determine what is or is not considered an art recognized equivalent. The art cited in the rejection clearly shows that copper and silver are art recognized equivalents because they both perform the same heat sinking function. There may be reasons why a skilled artisan might chose one over the other in a given situation, but the art clearly shows that a skilled artisan would consider both materials as useable equivalents in terms of there function as heat sinking metals, regardless of cost.

With respect to claim 57, applicant argues that figure 2 of Chen would result in a structure that does not teach every limitation of claim 57.

The examiner takes the position that applicant has attacked the rejection by considering the references individually as opposed to as considering them as a combination of references.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208

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USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Granted, Chen does not teach electrical interconnects extending through an opening, but that is what Nakashima is relied upon to teach. Chen is relied upon to teach the use of a metal foil and its function as a heat dissipater.

Applicant's arguments with respect to claim 45 have been fully considered and are persuasive. The rejection of claims 45-49, 51, 52, 55, and 56 has been withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view "Silver", Wikipedia free Encyclopedia or

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Wagner et al., "Easy Heatsink Mods to Drop CPU Temps", Chron USA or "Cooling Fundamentals: Thermal Conductivity" from FrostyTech.com.

Chan teaches a memory module comprising:

providing an insulative substrate (70) with circuitry thereon and an opening there through;

adhering a die (50) to the substrate with an electrically conductive adhesive (60) having circuitry supported thereby; and

electrically connecting the circuit on the die to the circuitry on the substrate with wire bonds (80) extending through the opening (Figure 1).

Chan fails to teach forming a thermally conductive material over at least a portion of the die, the material comprising a thermal conductivity greater than that of elemental copper.

"Silver", Wikipedia free Encyclopedia or Wagner et al., "Easy Heatsink Mods to Drop CPU Temps", Chron USA or "Cooling Fundamentals: Thermal Conductivity" from FrostyTech.com all teach the thermal conductivity of silver as being higher than copper (see highlighted sections).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the silver of "Silver", Wikipedia free Encyclopedia or Wagner et al., "Easy Heatsink Mods to Drop CPU Temps", Chron USA or "Cooling Fundamentals: Thermal Conductivity" from FrostyTech.com in the combined inventions of Chan and Chen because they all teach that silver has a higher thermal conductivity than copper, is

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an art recognized equivalent to copper and is the ideal material for ultra efficient heat sinks (FrostyTech, page 2, highlighted section).

The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution. Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

Regarding claim 43, Chan teaches the adhesive as being a silver-filled epoxy (3, 61 -4, 35).

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view "Silver", Wikipedia free Encyclopedia or Wagner et al., "Easy Heatsink Mods to Drop CPU Temps", Chron USA or "Cooling Fundamentals: Thermal Conductivity" from FrostyTech.com, as applied to claim 42 above, and further in view of Chen et al., US Patent 6,215,180.

Chan fails to teach the placing of a metal foil in physical contact with at least a portion of the die.

Chen teaches a heat dissipating structure comprising a heat dissipating member (59) in physical contact with at least a portion of the die (figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the heat dissipating member of Chen in the invention of Chan because Chen teaches that heat generated by the chip is dissipated by the member (abstract).

Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakashima et al., US Patent 5,661,086, in view of Chen et al., US Patent 6,215,180, and Wang et al., US Patent 6,226,140.

Nakashima teaches a process of making a plurality of strip lead frames comprising:

- forming a connected circuit substrate frame made of glass fabric reinforced epoxy resin (an insulative substrate) having a lead pattern on one face and an opening there through (6, 43+);

- forming a connected metals frame and adhering it to a second face of the connected circuits frame;

- mounting a die onto the connected metals frame within the opening; and

- electrically connecting, using bond wires that extend through the opening, the die to the lead pattern (figure 1).

Nakashima fails to teach the die adhering to both the metals frame and the circuits frame.

Chen teaches a heat dissipating structure wherein a structure similar to Nakashima is disclosed (Figure 1) and a structure wherein the die (21) is adhered to both a metal heat dissipating member (26) and an insulative substrate (22) having circuits thereon (Figures 2+).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the method of Nakashima to form the structure of Chen because Chen teaches that the structure of Figure 2 is an alternative to the structure of Figure 1.

Therefore, one of ordinary skill in the art would apply the process of Nakashima to the alternative invention of Chen.

The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution. Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964) ; In re Leshin 125 USPQ 416 (CCPA 1960)', Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

Nakashima and Chen fail to teach the die as comprising sidewalls extending from the insulative substrate and the metal foil adhered to the second surface thereof physically contacting at least a portion of at least one sidewall.

Wang, relied upon as taught above, teaches the foil in physical contact, as defined by the specification of the present application (p12, 9-17), with the sidewalls of the die.

Allowable Subject Matter

Claims 45-49, 51, 52, 55, and 56 stand allowable over the prior art.

Claims 58-62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 63-74 stand allowed over the prior art, pending final PTO approval of the terminal disclaimer filed 7/3/03.

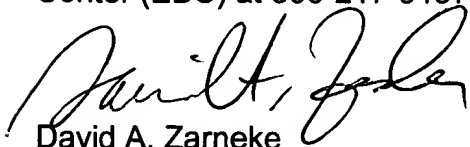
Claims 75-79 stand allowed over the prior art.

The following is a statement of reasons for the indication of allowable subject matter: these claims incorporate the limitations of objected claims 58-62 into an independent claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-F 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Tokar can be reached on (571)-272-1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David A. Zarneke
Primary Examiner
July 31, 2004